

## SEQUENCE LISTING

<110> Steward, Lance E.  
Fernandez-Salas, Ester  
Herrington, Todd  
Aoki, Kei Roger

<120> Clostridial Neurotoxin Compositions and  
Modified Clostridial Neurotoxins

<130> 17355CIP3 (BOT)

<140> US 10/757,077  
<141> 2004-01-14

<150> US 09/910,346  
<151> 2001-07-20

<150> US 09/620,840  
<151> 2000-07-21

<150> US 10/163,106  
<151> 2003-06-04

<160> 148

<170> FastSEQ for Windows Version 4.0

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<213> Clostridium botulinum serotype A

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<213> Rattus norvegicus

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Glu Glu Lys Arg Ala Ile Leu  
1 5

<210> 3  
<211> 7  
<212> PRT  
<213> Rattus norvegicus

Nonprovisional Patent Application

17355CIP3 (BOT)

Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<400> 3  
Glu Glu Lys Met Ala Ile Leu  
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<213> Rattus norvegicus

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<210> 6  
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<210> 8  
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<213> Gallus gallus

<400> 8  
Ser Asp Arg Gln Asn Leu Ile  
1 5

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<210> 9  
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<210> 10  
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<212> PRT  
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<400> 10  
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<210> 11  
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<212> PRT  
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<400> 11  
Ser Gln Ile Lys Arg Leu Leu  
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<210> 12  
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<400> 12  
Ala Asp Thr Gln Ala Leu Leu  
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<213> *Saccharomyces cerevisiae*

<400> 13  
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<210> 14  
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<213> *Clostridium botulinum* serotype A

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Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<400> 14  
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<223> Consensus sequence for Leucine-based motif.

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<400> 17  
Xaa Asp Xaa Xaa Xaa Leu Leu  
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17355CIP3 (BOT)

Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<222> (1)...(7)

<223> Consensus sequence for Leucine-based motif.

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<223> Xaa is any amino acid.

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<222> (3)...(5)

<223> Xaa is any amino acid.

<400> 19

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<223> Consensus sequence for Leucine-based motif.

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<222> (1)...(1)

<223> Xaa is any amino acid.

<221> VARIANT

<222> (3)...(5)

Nonprovisional Patent Application

17355CIP3 (BOT)

Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<223> Xaa is any amino acid.

<400> 20

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<210> 21

<211> 7

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<222> (1)...(7)

<223> Consensus sequence for Leucine-based motif.

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<221> VARIANT

<222> (3)...(5)

<223> Xaa is any amino acid.

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1 5

<210> 22

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<212> PRT

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<223> Consensus sequence for Leucine-based motif.

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<223> Xaa is any amino acid.

<221> VARIANT

<222> (3)...(5)

<223> Xaa is any amino acid.

<400> 22

Xaa Glu Xaa Xaa Xaa Ile Leu  
1 5

<210> 23

<211> 7

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17355CIP3 (BOT)

Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<212> PRT

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<221> SITE

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<223> Consensus sequence for Leucine-based motif.

<221> VARIANT

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<223> Xaa is any amino acid.

<221> VARIANT

<222> (3)...(5)

<223> Xaa is any amino acid.

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Xaa Glu Xaa Xaa Xaa Leu Met

1

5

<210> 24

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<221> SITE

<222> (1)...(4)

<223> Consensus sequence for Tyrosine-based motif.

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<222> (2)...(3)

<223> Xaa is any amino acid.

<221> VARIANT

<222> (4)...(4)

<223> Xaa is any hydrophobic amino acid.

<400> 24

Tyr Xaa Xaa Xaa

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<210> 25

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<212> PRT

<213> Artificial Sequence

<220>

<221> PEPTIDE

<222> (1)...(50)

<223> Peptide comprising a 6x His tag and S-tag

<400> 25

## Nonprovisional Patent Application

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## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

Met His His His His Ser Ser Gly Leu Val Pro Arg Gly Ser  
1 5 10 15  
Gly Met Lys Glu Thr Ala Ala Ala Lys Phe Glu Arg Gln His Met Asp  
20 25 30  
Ser Pro Asp Leu Gly Thr Asp Asp Asp Asp Lys Ala Met Tyr Lys Asp  
35 40 45  
Pro Val  
50

<210> 26  
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<213> Artificial Sequence

<220>  
<221> PEPTIDE  
<222> (1)...(14)  
<223> Peptide comprising a 6x His tag

<400> 26  
Asn Phe Thr Lys Leu Thr Arg Ala His His His His His His  
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<212> PRT  
<213> Clostridium botulinum serotype A

<400> 27  
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1 5

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<211> 22  
<212> PRT  
<213> Clostridium botulinum sertotype A

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Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
1 5 10 15  
Gly Ile Ile Thr Ser Lys  
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<210> 29  
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<212> PRT  
<213> Clostridium botulinum sertotype A

<400> 29  
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
   20                         25                         30  
 Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
   35                         40                         45  
 Asp Thr Phe Thr Asn Pro Glu Glu Gly Asp Leu Asn Pro Pro Pro Glu  
   50                         55                         60  
 Ala Lys Gln Val Pro Val Ser Tyr Tyr Asp Ser Thr Tyr Leu Ser Thr  
   65                         70                         75                         80  
 Asp Asn Glu Lys Asn Tyr Leu Lys Gly Val Thr Lys Leu Phe Glu  
   85                         90                         95  
 Arg Ile Tyr Ser Thr Asp Leu Gly Arg Met Leu Leu Thr Ser Ile Val  
   100                         105                         110  
 Arg Gly Ile Pro Phe Trp Gly Gly Ser Thr Ile Asp Thr Glu Leu Lys  
   115                         120                         125  
 Val Ile Asp Thr Asn Cys Ile Asn Val Ile Gln Pro Asp Gly Ser Tyr  
   130                         135                         140  
 Arg Ser Glu Glu Leu Asn Leu Val Ile Ile Gly Pro Ser Ala Asp Ile  
   145                         150                         155                         160  
 Ile Gln Phe Glu Cys Lys Ser Phe Gly His Glu Val Leu Asn Leu Thr  
   165                         170                         175  
 Arg Asn Gly Tyr Gly Ser Thr Gln Tyr Ile Arg Phe Ser Pro Asp Phe  
   180                         185                         190  
 Thr Phe Gly Phe Glu Glu Ser Leu Glu Val Asp Thr Asn Pro Leu Leu  
   195                         200                         205  
 Gly Ala Gly Lys Phe Ala Thr Asp Pro Ala Val Thr Leu Ala His Glu  
   210                         215                         220  
 Leu Ile His Ala Gly His Arg Leu Tyr Gly Ile Ala Ile Asn Pro Asn  
   225                         230                         235                         240  
 Arg Val Phe Lys Val Asn Thr Asn Ala Tyr Tyr Glu Met Ser Gly Leu  
   245                         250                         255  
 Glu Val Ser Phe Glu Glu Leu Arg Thr Phe Gly Gly His Asp Ala Lys  
   260                         265                         270  
 Phe Ile Asp Ser Leu Gln Glu Asn Glu Phe Arg Leu Tyr Tyr Tyr Asn  
   275                         280                         285  
 Lys Phe Lys Asp Ile Ala Ser Thr Leu Asn Lys Ala Lys Ser Ile Val  
   290                         295                         300  
 Gly Thr Thr Ala Ser Leu Gln Tyr Met Lys Asn Val Phe Lys Glu Lys  
   305                         310                         315                         320  
 Tyr Leu Leu Ser Glu Asp Thr Ser Gly Lys Phe Ser Val Asp Lys Leu  
   325                         330                         335  
 Lys Phe Asp Lys Leu Tyr Lys Met Leu Thr Glu Ile Tyr Thr Glu Asp  
   340                         345                         350  
 Asn Phe Val Lys Phe Phe Lys Val Leu Asn Arg Lys Thr Tyr Leu Asn  
   355                         360                         365  
 Phe Asp Lys Ala Val Phe Lys Ile Asn Ile Val Pro Lys Val Asn Tyr  
   370                         375                         380  
 Thr Ile Tyr Asp Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn  
   385                         390                         395                         400  
 Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu  
   405                         410                         415  
 Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg  
   420                         425                         430  
 Gly Ile Ile Thr Ser Lys  
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<210> 30  
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<213> Clostridium botulinum sertotype B

<400> 30  
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
1 5 10 15  
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20 25 30  
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
35 40 45  
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
50 55 60  
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
65 70 75 80  
Thr Asn Asp Lys Lys Asn Ile Phe Leu Gln Thr Met Ile Lys Leu Phe  
85 90 95  
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
100 105 110  
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
115 120 125  
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
130 135 140  
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
145 150 155 160  
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
165 170 175  
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
180 185 190  
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
195 200 205  
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
210 215 220  
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
225 230 235 240  
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
245 250 255  
Phe Met Gln Ser Thr Asp Ala Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
260 265 270  
Gly Gly Gln Asp Pro Ser Ile Ile Thr Pro Ser Thr Asp Lys Ser Ile  
275 280 285  
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
290 295 300  
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
305 310 315 320  
Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly  
325 330 335  
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asp Lys Leu Tyr Lys Ser Leu  
340 345 350  
Met Phe Gly Phe Thr Glu Thr Asn Ile Ala Glu Asn Tyr Lys Ile Lys  
355 360 365  
Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys  
370 375 380

Asn Leu Leu Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile  
385 390 395 400  
Ser Asp Lys Asp Met Glu Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile  
405 410 415  
Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val Tyr  
420 425 430  
Lys Ile Gln Met Cys Lys Ser Val Lys  
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<210> 31

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<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> PHOSPHORYLATION

<222> (1)...(4)

<223> Tyrosine-based motif

<400> 31

Tyr Ile Lys Ile

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<210> 32

<211> 4

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> PHOSPHORYLATION

<222> (1)...(4)

<223> Tyrosine-based motif

<400> 32

Tyr Asp Ser Thr

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<210> 33

<211> 4

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> PHOSPHORYLATION

<222> (1)...(4)

<223> Tyrosine-based motif

<400> 33

Tyr Gly Ser Thr

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<210> 34  
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<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> PHOSPHORYLATION  
<222> (1)...(4)  
<223> Tyrosine-based motif

<400> 34  
Tyr Asn Lys Phe  
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<210> 35  
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<213> Clostridium botulinum serotype A

<220>  
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<223> Tyrosine-based motif

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<210> 36  
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<220>  
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<222> (1)...(4)  
<223> Tyrosine-based motif

<400> 36  
Tyr Leu Asn Phe  
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<210> 37  
<211> 4  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
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<222> (1)...(4)  
<223> Tyrosine-based motif

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Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<400> 37

Tyr Asp Gly Phe  
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<210> 38

<211> 4

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<213> Clostridium botulinum serotype A

<220>

<221> PHOSPHORYLATION

<222> (1)...(4)

<223> Tyrosine-based motif

<400> 38

Tyr Lys Leu Leu  
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<210> 39

<211> 30

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<400> 39

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15  
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20 25 30

<210> 40

<211> 50

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<400> 40

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln  
1 5 10 15  
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr  
20 25 30  
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr  
35 40 45  
Ser Lys

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<210> 41  
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<213> Clostridium botulinum serotype B

<220>  
<221> DOMAIN  
<222> (13)...(30)  
<223> Amino terminal 30 amino acids of light chain

<400> 41  
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
1 5 10 15  
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr  
20 25 30

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<400> 42  
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys  
1 5 10 15  
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu  
20 25 30  
Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser  
35 40 45  
Val Lys  
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<210> 43  
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<220>  
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<222> (1)...(30)  
<223> Amino terminal 30 amino acids of light chain

<400> 43  
Met Pro Ile Thr Ile Asn Asn Phe Asn Tyr Ser Asp Pro Val Asp Asn  
1 5 10 15  
Lys Asn Ile Leu Tyr Leu Asp Thr His Leu Asn Thr Leu Ala

20

25

30

<210> 44  
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<223> Carboxyl terminal 50 amino acids of light chain

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1 5 10 15  
Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Tyr  
20 25 30  
Leu Phe Thr Lys Phe Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr  
35 40 45  
Asn Lys  
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<210> 45  
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<212> PRT  
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<220>  
<221> DOMAIN  
<222> (1)...(30)  
<223> Amino terminal 30 amino acids of light chain

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Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile  
20 25 30

<210> 46  
<211> 50  
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<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

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Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile  
1 5 10 15  
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu

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Ser	Ser	Glu	Ser	Val	Val	Asp	Leu	Phe	Thr	Lys	Val	Cys	Leu	Arg	Leu
	35				40					45					
Thr	Lys														
	50														

&lt;210&gt; 47

&lt;211&gt; 30

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype E

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(30)

&lt;223&gt; Amino terminal 30 amino acid of light chain

&lt;400&gt; 47

Met	Pro	Lys	Ile	Asn	Ser	Phe	Asn	Tyr	Asn	Asp	Pro	Val	Asn	Asp	Arg
1						5			10				15		
Thr	Ile	Leu	Tyr	Ile	Lys	Pro	Gly	Gly	Cys	Gln	Glu	Phe	Tyr		
							25						30		

&lt;210&gt; 48

&lt;211&gt; 50

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype E

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(50)

&lt;223&gt; Carboxyl terminal 50 amino acids of light chain

&lt;400&gt; 48

Gly	Tyr	Asn	Ile	Asn	Asn	Leu	Lys	Val	Asn	Phe	Arg	Gly	Gln	Asn	Ala
1							5		10			15			
Asn	Leu	Asn	Pro	Arg	Ile	Ile	Thr	Pro	Ile	Thr	Gly	Arg	Gly	Leu	Val
							20		25			30			
Lys	Lys	Ile	Ile	Arg	Phe	Cys	Lys	Asn	Ile	Val	Ser	Val	Lys	Gly	Ile
							35		40			45			
Arg	Lys														
	50														

&lt;210&gt; 49

&lt;211&gt; 30

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype F

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(30)

&lt;223&gt; Amino terminal 30 amino acids of light chain

<400> 49  
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Asp Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys Ser  
20 25 30

<210> 50  
<211> 50

<212> PRT

<213> Clostridium botulinum serotype F

<220>  
<221> DOMAIN  
<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

<400> 50  
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg  
1 5 10 15  
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp  
20 25 30  
Lys Gly Leu Val Glu Lys Ile Val Lys Phe Cys Lys Ser Val Ile Pro  
35 40 45  
Arg Lys  
50

<210> 51  
<211> 30  
<212> PRT

<213> Clostridium botulinum serotype G

<220>  
<221> DOMAIN  
<222> (1)...(30)  
<223> Amino terminal 30 amino acids of light chain

<400> 51  
Met Pro Val Asn Ile Lys Asn Phe Asn Tyr Asn Asp Pro Ile Asn Asn  
1 5 10 15  
Asp Asp Ile Ile Met Met Glu Pro Phe Asn Asp Pro Gly Pro  
20 25 30

<210> 52  
<211> 50  
<212> PRT

<213> Clostridium botulinum serotype G

<220>  
<221> DOMAIN  
<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

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<400> 52

Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe  
1 5 10 15  
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Glu Glu Ile Ser  
20 25 30  
Leu Glu His Leu Val Ile Tyr Arg Ile Ala Met Cys Lys Pro Val Met  
35 40 45  
Tyr Lys  
50

<210> 53

<211> 30

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (4)...(4)

<223> Alanine substitution

<400> 53

Met Pro Phe Ala Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15  
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20 25 30

<210> 54

<211> 50

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (25)...(25)

<223> Arginine substitution

<400> 54

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln  
1 5 10 15  
Asn Thr Glu Ile Asn Asn Met Asn Arg Thr Lys Leu Lys Asn Phe Thr  
20 25 30  
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr  
35 40 45  
Ser Lys  
50

<210> 55

<211> 30

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (10)...(10)

<223> Lysine substitution

<400> 55

Met Pro Phe Val Asn Lys Gln Phe Asn Lys Lys Asp Pro Val Asn Gly

1 5 10 15

Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20 25 30

<210> 56

<211> 50

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (31)...(31)

<223> Alanine substitution

<221> VARIANT

<222> (32)...(32)

<223> Alanine substitution

<400> 56

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln

1 5 10 15

Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Ala Ala  
20 25 30

Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr  
35 40 45

Ser Lys

50

<210> 57

<211> 30

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (21)...(21)

<223> Arginine substitution

<400> 57

Met	Pro	Phe	Val	Asn	Lys	Gln	Phe	Asn	Tyr	Lys	Asp	Pro	Val	Asn	Gly
1				5				10					15		
Val	Asp	Ile	Ala	Arg	Ile	Lys	Ile	Pro	Asn	Ala	Gly	Gln	Met		
		20				25							30		

<210> 58

<211> 50

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (13)...(13)

<223> Histidine substitution

<400> 58

Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	Ala	Asn	His	Asn	Gly	Gln
1				5				10				15			
Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu	Lys	Asn	Phe	Thr
		20						25				30			
Gly	Leu	Phe	Glu	Phe	Tyr	Lys	Leu	Leu	Cys	Val	Arg	Gly	Ile	Ile	Thr
	35					40					45				
Ser	Lys														
	50														

<210> 59

<211> 30

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (7)...(7)

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&lt;223&gt; Histidine substitution

&lt;400&gt; 59

Met Pro Phe Val Asn Lys His Phe Asn Tyr Lys Asp Pro Val Asn Gly			
1	5	10	15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met			
20	25	30	

&lt;210&gt; 60

&lt;211&gt; 50

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype A

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(50)

&lt;223&gt; Carboxyl terminal 50 amino acids of light chain

&lt;221&gt; VARIANT

&lt;222&gt; (43)...(43)

&lt;223&gt; Alanine substitution

&lt;400&gt; 60

Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln			
1	5	10	15
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr			
20	25	30	
Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Ala Arg Gly Ile Ile Thr			
35	40	45	
Ser Lys			
50			

&lt;210&gt; 61

&lt;211&gt; 30

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype B

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(30)

&lt;223&gt; Amino terminal 30 amino acids of light chain

&lt;221&gt; VARIANT

&lt;222&gt; (3)...(3)

&lt;223&gt; Alanine substitution

&lt;400&gt; 61

Met Pro Ala Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn			
1	5	10	15
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr			
20	25	30	

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<210> 62

<211> 50

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (44)...(44)

<223> Arginine substitution

<400> 62

Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys  
1 5 10 15

Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu  
20 25 30

Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Arg Met Cys Lys Ser  
35 40 45

Val Lys  
50

<210> 63

<211> 30

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (21)...(21)

<223> Alanine substitution

<221> VARIANT

<222> (22)...(22)

<223> Alanine substitution

<400> 63

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
1 5 10 15

Asp Asn Ile Ile Ala Ala Glu Pro Pro Phe Ala Arg Gly Thr  
20 25 30

<210> 64

<211> 50

<212> PRT

<213> Clostridium botulinum serotype B

<220>  
<221> DOMAIN  
<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT  
<222> (41)...(41)  
<223> Arginine substitution

<400> 64  
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys  
1 5 10 15  
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu  
20 25 30  
Ile Ser Lys Glu His Leu Ala Val Arg Lys Ile Gln Met Cys Lys Ser  
35 40 45  
Val Lys  
50

<210> 65  
<211> 30  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> DOMAIN  
<222> (1)...(30)  
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT  
<222> (10)...(10)  
<223> Arginine substitution

<400> 65  
Met Pro Val Thr Ile Asn Asn Phe Asn Arg Asn Asp Pro Ile Asp Asn  
1 5 10 15  
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr  
20 25 30

<210> 66  
<211> 50  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> DOMAIN  
<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT  
<222> (30)...(30)  
<223> Lysine substitution

&lt;400&gt; 66

Tyr	Thr	Ile	Glu	Glu	Gly	Phe	Asn	Ile	Ser	Asp	Lys	Asn	Met	Gly	Lys
1				5				10					15		
Glu	Tyr	Arg	Gly	Gln	Asn	Lys	Ala	Ile	Asn	Lys	Gln	Ala	Lys	Glu	Glu
				20				25				30			
Ile	Ser	Lys	Glu	His	Leu	Ala	Val	Tyr	Lys	Ile	Gln	Met	Cys	Lys	Ser
				35				40				45			
Val	Lys														
	50														

&lt;210&gt; 67

&lt;211&gt; 30

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype C1

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(30)

&lt;223&gt; Amino terminal 30 amino acids of light chain

&lt;221&gt; VARIANT

&lt;222&gt; (8)...(8)

&lt;223&gt; Lysine substitution

&lt;400&gt; 67

Met	Pro	Ile	Thr	Ile	Asn	Asn	Lys	Asn	Tyr	Ser	Asp	Pro	Val	Asp	Asn
1					5				10				15		
Lys	Asn	Ile	Leu	Tyr	Leu	Asp	Thr	His	Leu	Asn	Thr	Leu	Ala		
				20				25				30			

&lt;210&gt; 68

&lt;211&gt; 50

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype C1

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(50)

&lt;223&gt; Carboxyl terminal 50 amino acids of light chain

&lt;221&gt; VARIANT

&lt;222&gt; (48)...(48)

&lt;223&gt; Arginine substitution

&lt;400&gt; 68

Asn	Ile	Pro	Lys	Ser	Asn	Leu	Asn	Val	Leu	Phe	Met	Gly	Gln	Asn	Leu
1					5			10				15			
Ser	Arg	Asn	Pro	Ala	Leu	Arg	Lys	Val	Asn	Pro	Glu	Asn	Met	Leu	Tyr
					20			25				30			
Leu	Phe	Thr	Lys	Phe	Cys	His	Lys	Ala	Ile	Asp	Gly	Arg	Ser	Leu	Arg
				35			40				45				
Asn	Lys														
	50														

<210> 69

<211> 30

<212> PRT

<213> Clostridium botulinum serotype D

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (5)...(5)

<223> Alanine substitution

<221> VARIANT

<222> (14)...(14)

<223> Alanine substitution

<400> 69

Met Thr Trp Pro Ala Lys Asp Phe Asn Tyr Ser Asp Pro Ala Asn Asp  
1 5 10 15  
Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile  
20 25 30

<210> 70

<211> 50

<212> PRT

<213> Clostridium botulinum serotype D

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (44)...(44)

<223> Alanine substitution

<400> 70

Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile  
1 5 10 15  
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu  
20 25 30  
Ser Ser Glu Ser Val Val Asp Leu Phe Thr Lys Ala Cys Leu Arg Leu  
35 40 45  
Thr Lys  
50

<210> 71

<211> 30

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (13)...(13)

<223> Alanine substitution

<400> 71

Met	Pro	Lys	Ile	Asn	Ser	Phe	Asn	Tyr	Asn	Asp	Pro	Ala	Asn	Asp	Arg
1						5			10						15
Thr	Ile	Leu	Tyr	Ile	Lys	Pro	Gly	Gly	Cys	Gln	Glu	Phe	Tyr		
						20			25						30

<210> 72

<211> 50

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (31)...(31)

<223> Histidine substitution

<400> 72

Gly	Tyr	Asn	Ile	Asn	Asn	Leu	Lys	Val	Asn	Phe	Arg	Gly	Gln	Asn	Ala
1						5			10						15
Asn	Leu	Asn	Pro	Arg	Ile	Ile	Thr	Pro	Ile	Thr	Gly	Arg	Gly	His	Val
								20		25					30
Lys	Lys	Ile	Ile	Arg	Phe	Cys	Lys	Asn	Ile	Val	Ser	Val	Lys	Gly	Ile
						35			40						45
Arg	Lys														
	50														

<210> 73

<211> 30

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (7)...(7)

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<223> Arginine substitution

<400> 73

Met	Pro	Lys	Ile	Asn	Ser	Arg	Asn	Tyr	Asn	Asp	Pro	Val	Asn	Asp	Arg
1						5			10					15	
Thr	Ile	Leu	Tyr	Ile	Lys	Pro	Gly	Gly	Cys	Gln	Glu	Phe	Tyr		
						20			25					30	

<210> 74

<211> 50

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (42)...(42)

<223> Alanine substitution

<221> VARIANT

<222> (43)...(43)

<223> Alanine substitution

<400> 74

Gly	Tyr	Asn	Ile	Asn	Asn	Leu	Lys	Val	Asn	Phe	Arg	Gly	Gln	Asn	Ala
1						5			10				15		
Asn	Leu	Asn	Pro	Arg	Ile	Ile	Thr	Pro	Ile	Thr	Gly	Arg	Gly	Leu	Val
						20			25			30			
Lys	Lys	Ile	Ile	Arg	Phe	Cys	Lys	Asn	Ala	Ala	Ser	Val	Lys	Gly	Ile
						35			40			45			
Arg	Lys														50

<210> 75

<211> 30

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (30)...(30)

<223> Arginine substitution

<400> 75

Met	Pro	Lys	Ile	Asn	Ser	Phe	Asn	Tyr	Asn	Asp	Pro	Val	Asn	Asp	Arg
1						5			10				15		

Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Arg  
20   30

<210> 76

<211> 50

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> DOMAIN

<222> (1)...(50)

<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT

<222> (45)...(45)

<223> Alanine substitution

<400> 76

Gly	Tyr	Asn	Ile	Asn	Asn	Leu	Lys	Val	Asn	Phe	Arg	Gly	Gln	Asn	Ala
1				5				10						15	
Asn	Leu	Asn	Pro	Arg	Ile	Ile	Thr	Pro	Ile	Thr	Gly	Arg	Gly	Leu	Val
					20			25					30		
Lys	Lys	Ile	Ile	Arg	Phe	Cys	Lys	Asn	Ile	Val	Ser	Ala	Lys	Gly	Ile
				35				40					45		
Arg	Lys														
				50											

<210> 77

<211> 30

<212> PRT

<213> Clostridium botulinum serotype F

<220>

<221> DOMAIN

<222> (1)...(30)

<223> Amino terminal 30 amino acids of light chain

<221> VARIANT

<222> (3)...(3)

<223> Alanine substitution

<400> 77

Met	Pro	Ala	Ala	Ile	Asn	Ser	Phe	Asn	Tyr	Asn	Asp	Pro	Val	Asn	Asp
1					5				10					15	
Asp	Thr	Ile	Leu	Tyr	Met	Gln	Ile	Pro	Tyr	Glu	Glu	Lys	Ser		
					20			25					30		

<210> 78

<211> 50

<212> PRT

<213> Clostridium botulinum serotype F

<220>  
<221> DOMAIN  
<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT  
<222> (46)...(46)  
<223> Alanine substitution

<400> 78  
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg  
1 5 10 15  
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp  
20 25 30  
Lys Gly Leu Val Glu Lys Ile Val Lys Phe Cys Lys Ser Ala Ile Pro  
35 40 45  
Arg Lys  
50

<210> 79  
<211> 30  
<212> PRT  
<213> Clostridium botulinum serotype G

<220>  
<221> DOMAIN  
<222> (1)...(30)  
<223> Amino terminal 30 amino acids of light chain

<221> VARIANT  
<222> (8)...(8)  
<223> Histidine substitution

<400> 79  
Met Pro Val Asn Ile Lys Asn His Asn Tyr Asn Asp Pro Ile Asn Asn  
1 5 10 15  
Asp Asp Ile Ile Met Met Glu Pro Phe Asn Asp Pro Gly Pro  
20 25 30

<210> 80  
<211> 50  
<212> PRT  
<213> Clostridium botulinum serotype G

<220>  
<221> DOMAIN  
<222> (1)...(50)  
<223> Carboxyl terminal 50 amino acids of light chain

<221> VARIANT  
<222> (47)...(47)  
<223> Alanine substitution

<400> 80  
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe  
1 5 10 15  
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Glu Glu Ile Ser  
20 25 30  
Leu Glu His Leu Val Ile Tyr Arg Ile Ala Met Cys Lys Pro Ala Met  
35 40 45  
Tyr Lys  
50

<210> 81  
<211> 26  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(26)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 81  
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1 5 10 15  
Val Asp Ile Ala Tyr Ile Lys Ile Pro His  
20 25

<210> 82  
<211> 43  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(43)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 82  
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln  
1 5 10 15  
Asn Thr Glu Ile Asn Asn Met Asn Ala Ala Ala Ala Ala Ala Ala  
20 25 30  
Ala Ala Cys Val Arg Gly Ile Ile Thr Ser Lys  
35 40

<210> 83  
<211> 26  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(26)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 83

Met Ala Ala Ala Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala  
1               5               10               15  
Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met  
20               25

<210> 84

<211> 48

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> VARIANT

<222> (1)...(48)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 84

Gly Lys Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln  
1               5               10               15  
Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr  
20               25               30  
Gly Leu Phe Glu Phe Tyr Lys Cys Val Arg Gly Ile Ile Thr Ser Lys  
35               40               45

<210> 85

<211> 26

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> VARIANT

<222> (1)...(26)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 85

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1               5               10               15  
Val Asp Ile Ala Arg Asn Ala Gly Gln Met  
20               25

<210> 86

<211> 46

<212> PRT

<213> Clostridium botulinum serotype A

<220>

<221> VARIANT

<222> (1)...(46)

<223> Variant of carboxyl-terminal 50 amino acids of LC

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&lt;400&gt; 86

Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	Ala	His	Asn	Thr	Glu	Ile
1				5				10					15		
Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu	Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu
				20				25				30			
Phe	Tyr	Lys	Leu	Leu	Cys	Val	Arg	Gly	Ile	Ile	Thr	Ser	Lys		
				35			40				45				

&lt;210&gt; 87

&lt;211&gt; 26

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype A

&lt;220&gt;

&lt;221&gt; VARIANT

&lt;222&gt; (1)...(26)

&lt;223&gt; Variant of amino-terminal 30 amino acids of LC

&lt;400&gt; 87

Met	Pro	Lys	Val	Asn	Lys	Gln	Phe	Asn	Val	Asn	Gly	Val	Asp	Ile	Ala
1					5				10				15		
Tyr	Ile	Lys	Ile	Pro	Asn	Ala	Gly	Gln	Met						
				20				25							

&lt;210&gt; 88

&lt;211&gt; 42

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype A

&lt;220&gt;

&lt;221&gt; VARIANT

&lt;222&gt; (1)...(42)

&lt;223&gt; Variant of carboxyl-terminal 50 amino acids of LC

&lt;400&gt; 88

Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	Ala	Asn	Phe	Asn	Gly	Gln
1					5				10				15		
Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu	Lys	Asn	Phe	Thr
					20			25				30			
Gly	Leu	Phe	Glu	Phe	Arg	Arg	Thr	Ser	Lys						
				35			40								

&lt;210&gt; 89

&lt;211&gt; 30

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype B

&lt;220&gt;

&lt;221&gt; VARIANT

&lt;222&gt; (1)...(30)

&lt;223&gt; Variant of amino-terminal 30 amino acids of LC

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Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<400> 89  
Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
1 5 10 15  
Asp Asn Ile Ile Ala Ala Ala Ala Ala Ala Arg Gly Thr  
20 25 30

<210> 90  
<211> 37  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> VARIANT  
<222> (1)...(37)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 90  
Tyr Thr Ile Pro Pro Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys  
1 5 10 15  
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu  
20 25 30  
Ile Ser Lys Glu His  
35

<210> 91  
<211> 26  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> VARIANT  
<222> (1)...(26)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 91  
Met Pro Ala Phe Asn Tyr Asn Asp Pro Ile Asp Asn Asn Ile Ile  
1 5 10 15  
Met Met Glu Pro Pro Phe Ala Arg Gly Thr  
20 25

<210> 92  
<211> 50  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> VARIANT  
<222> (1)...(50)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 92  
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys

1                   5                   10                   15  
Glu Tyr Arg Gly Gln Asn Lys Ala Ala Ala Ala Ala Glu Glu  
20                 25                 30  
Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser  
35                 40                 45  
Val Lys  
50

<210> 93

<211> 20

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> VARIANT

<222> (1)...(20)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 93

Met Pro Val Thr Ile Asn Asn Phe Asn Arg Met Met Glu Pro Pro Phe  
1                   5                   10                   15  
Ala Arg Gly Thr  
20

<210> 94

<211> 44

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> VARIANT

<222> (1)...(44)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 94

Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys  
1                   5                   10                   15  
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Ala Ala  
20                 25                 30  
Ala Ala Ala Ala Ile Gln Met Cys Lys Ser Val Lys  
35                 40

<210> 95

<211> 21

<212> PRT

<213> Clostridium botulinum serotype C1

<220>

<221> VARIANT

<222> (1)...(21)

<223> Variant of amino-terminal 30 amino acids of LC

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Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

<400> 95  
Met Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu Asp Thr His  
1 5 10 15  
Leu Asn Thr Leu Ala  
20

<210> 96  
<211> 47  
<212> PRT  
<213> Clostridium botulinum serotype C1

<220>  
<221> VARIANT  
<222> (1)...(47)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 96  
Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu  
1 5 10 15  
Ser Arg Asn Pro Ala Leu Arg Lys Val Asn Pro Glu Asn Met Leu Ala  
20 25 30  
Ala Ala Cys His Lys Ala Ile Asp Gly Arg Ser Leu Tyr Asn Lys  
35 40 45

<210> 97  
<211> 26  
<212> PRT  
<213> Clostridium botulinum serotype D

<220>  
<221> CONFLICT  
<222> (1)...(26)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 97  
Met Thr Arg Pro Val Lys Asp Asp Pro Val Asn Asp Asn Asp Ile Leu  
1 5 10 15  
Tyr Leu Arg Ile Pro Gln Asn Lys Leu Ile  
20 25

<210> 98  
<211> 44  
<212> PRT  
<213> Clostridium botulinum serotype D

<220>  
<221> VARIANT  
<222> (1)...(44)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 98  
Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile

```

1           5          10         15
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Leu Gln Lys Leu
20          25          30
Asp Leu Pro Pro Lys Val Cys Leu Arg Leu Thr Lys
35          40

```

<210> 99

<211> 31

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1) . . . (31)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 99

Met Pro Lys Ile Asn Ser Pro Pro Asn Tyr Asn Asp Pro Val Asn Asp	1	5	10	15
Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr	20	25	30	

<210> 100

<211> 50

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1) ... (50)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 100

Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala  
 1 5 10 15  
 Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val  
 20 25 30  
 Lys Lys Ala Ala Ala Ala Cys Lys Asn Ile Val Ser Val Lys Gly Ile  
 35 40 45  
 Arg Lys  
 50

<210> 101

<211> 33

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1) . . . (33)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 101  
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Ala Ala Ala  
1 5 10 15  
Asn Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe  
20 25 30  
Tyr

<210> 102  
<211> 47  
<212> PRT  
<213> Clostridium botulinum serotype E

<220>  
<221> VARIANT  
<222> (1)...(47)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 102  
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala  
1 5 10 15  
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val  
20 25 30  
His Arg Phe Cys Lys Asn Ile Val Ser Val Lys Gly Ile Arg Lys  
35 40 45

<210> 103  
<211> 30  
<212> PRT  
<213> Clostridium botulinum serotype E

<220>  
<221> VARIANT  
<222> (1)...(30)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 103  
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg  
1 5 10 15  
Thr Ile Leu Lys Ile Lys Pro Gly Gly Cys Lys Glu Phe Tyr  
20 25 30

<210> 104  
<211> 33  
<212> PRT  
<213> Clostridium botulinum serotype E

<220>  
<221> VARIANT  
<222> (1)...(33)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 104  
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala  
1 5 10 15  
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Pro  
20 25 30  
Pro

<210> 105  
<211> 24  
<212> PRT  
<213> Clostridium botulinum serotype F

<220>  
<221> VARIANT  
<222> (1)...(24)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 105  
Met Pro Asn Tyr Asn Asp Pro Val Asn Asp Asp Thr Ile Leu Tyr Met  
1 5 10 15  
Gln Ile Pro Tyr Glu Glu Lys Ser  
20

<210> 106  
<211> 48  
<212> PRT  
<213> Clostridium botulinum serotype F

<220>  
<221> VARIANT  
<222> (1)...(48)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 106  
Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg  
1 5 10 15  
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp  
20 25 30  
Lys Gly Ala Ala Ala Ala Ala Cys Lys Ser Val Ile Pro Arg Lys  
35 40 45

<210> 107  
<211> 26  
<212> PRT  
<213> Clostridium botulinum serotype G

<220>  
<221> CONFLICT  
<222> (1)...(26)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 107  
Met Pro Val Asn Ile Pro Pro Asp Pro Ile Asn Asn Asp Asp Ile Ile  
1 5 10 15  
Met Met Glu Pro Phe Asn Asp Pro Gly Pro  
20 25

<210> 108  
<211> 35  
<212> PRT  
<213> Clostridium botulinum serotype G

<220>  
<221> CONFLICT  
<222> (1)...(35)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 108  
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe  
1 5 10 15  
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Tyr Ala Ala Ala  
20 25 30  
Ala Ala Ala  
35

<210> 109  
<211> 22  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(22)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 109  
Met Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys Ile  
1 5 10 15  
Pro Asn Ala Gly Gln Met  
20

<210> 110  
<211> 39  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(39)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 110  
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln

1	5	10	15												
Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu	Lys	Asn	Phe	Thr
			20					25						30	
Gly	Leu	Phe	Glu	Phe	Tyr	Lys									
							35								

&lt;210&gt; 111

&lt;211&gt; 24

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype A

&lt;220&gt;

&lt;221&gt; VARIANT

&lt;222&gt; (1)...(24)

&lt;223&gt; Variant of amino-terminal 30 amino acids of LC

&lt;400&gt; 111

Met	Pro	Phe	Val	Asn	Lys	Gln	Val	Asn	Gly	Val	Asp	Ile	Ala	Tyr	Ile
1				5				10					15		
Lys	Ile	Pro	Asn	Ala	Gly	Gln	Met								
				20											

&lt;210&gt; 112

&lt;211&gt; 40

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype A

&lt;220&gt;

&lt;221&gt; VARIANT

&lt;222&gt; (1)...(40)

&lt;223&gt; Variant of carboxyl-terminal 50 amino acids of LC

&lt;400&gt; 112

Gly	Phe	Asn	Leu	Arg	Asn	Thr	Asn	Leu	Ala	Ala	Asn	Phe	Asn	Gly	Gln
1				5				10			15				
Asn	Thr	Glu	Ile	Asn	Asn	Met	Asn	Phe	Thr	Lys	Leu	Lys	Leu	Leu	Cys
			20			25					30				
Val	Arg	Gly	Ile	Ile	Thr	Ser	Lys								
			35			40									

&lt;210&gt; 113

&lt;211&gt; 24

&lt;212&gt; PRT

&lt;213&gt; Clostridium botulinum serotype A

&lt;220&gt;

&lt;221&gt; VARIANT

&lt;222&gt; (1)...(24)

&lt;223&gt; Variant of amino-terminal 30 amino acids of LC

&lt;400&gt; 113

Met	Pro	Phe	Val	Asn	Lys	Gln	Phe	Asn	Tyr	Lys	Asp	Pro	Ala	Tyr	Ile
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

1                   5                   10                   15  
Lys Ile Pro Asn Ala Gly Gln Met  
20

<210> 114  
<211> 42  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(42)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 114  
Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln  
1                   5                   10                   15  
Asn Thr Glu Ile Asn Asn Met Asn Gly Leu Phe Glu Phe Tyr Lys Leu  
20                   25                   30  
Leu Cys Val Arg Gly Ile Ile Thr Ser Lys  
35                   40

<210> 115  
<211> 20  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> VARIANT  
<222> (1)...(20)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 115  
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
1                   5                   10                   15  
Val Asp Ile Ala  
20

<210> 116  
<211> 40  
<212> PRT  
<213> Clostridium botulinum serotype A

<220>  
<221> CONFLICT  
<222> (1)...(40)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 116  
Gly Phe Asn Leu Arg Asn Asn Thr Glu Ile Asn Asn Met Asn Phe Thr  
1                   5                   10                   15

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Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys  
20 25 30  
Val Arg Gly Ile Ile Thr Ser Lys  
35 40

<210> 117

<211> 23

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> VARIANT

<222> (1)...(23)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 117

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
1 5 10 15  
Asp Asn Ile Ile Met Met Glu  
20

<210> 118

<211> 45

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> VARIANT

<222> (1)...(45)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 118

Tyr Thr Ile Ile Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln  
1 5 10 15  
Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His  
20 25 30  
Leu Ala Val Tyr Lys Ile Gln Met Cys Lys Ser Val Lys  
35 40 45

<210> 119

<211> 20

<212> PRT

<213> Clostridium botulinum serotype B

<220>

<221> CONFLICT

<222> (1)...(20)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 119

Met Pro Val Thr Ile Asn Asn Phe Asn Tyr Asn Asp Glu Pro Pro Phe  
1 5 10 15

Ala Arg Gly Thr  
20

<210> 120  
<211> 42  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> VARIANT  
<222> (1)...(42)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 120  
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Gly Gln Asn Lys Ala  
1 5 10 15  
Ile Asn Lys Gln Ala Tyr Glu Glu Ile Ser Lys Glu His Leu Ala Val  
20 25 30  
Tyr Lys Ile Gln Met Cys Lys Ser Val Lys  
35 40

<210> 121  
<211> 22  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> VARIANT  
<222> (1)...(22)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 121  
Met Pro Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile Met Met Glu Pro  
1 5 10 15  
Pro Phe Ala Arg Gly Thr  
20

<210> 122  
<211> 38  
<212> PRT  
<213> Clostridium botulinum serotype B

<220>  
<221> VARIANT  
<222> (1)...(38)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 122  
Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly Lys  
1 5 10 15  
Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Lys Ile Gln  
20 25 30

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Met Cys Lys Ser Val Lys  
35

<210> 123

<211> 23

<212> PRT

<213> Clostridium botulinum serotype C1

<220>

<221> VARIANT

<222> (1)...(23)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 123

Met Pro Ile Ser Asp Pro Val Asp Asn Lys Asn Ile Leu Tyr Leu Asp  
1 5 10 15  
Thr His Leu Asn Thr Leu Ala  
20

<210> 124

<211> 40

<212> PRT

<213> Clostridium botulinum serotype C1

<220>

<221> VARIANT

<222> (1)...(40)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 124

Asn Ile Pro Lys Ser Asn Leu Asn Val Leu Phe Met Gly Gln Asn Leu  
1 5 10 15  
Ser Arg Asn Pro Ala Leu Arg Lys Val Lys Phe Cys His Lys Ala Ile  
20 25 30  
Asp Gly Arg Ser Leu Tyr Asn Lys  
35 40

<210> 125

<211> 20

<212> PRT

<213> Clostridium botulinum serotype D

<220>

<221> CONFLICT

<222> (1)...(20)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 125

Met Thr Trp Val Asn Asp Asn Asp Ile Leu Tyr Leu Arg Ile Pro Gln  
1 5 10 15  
Asn Lys Leu Ile

20

<210> 126  
<211> 40  
<212> PRT  
<213> Clostridium botulinum serotype D

<220>  
<221> CONFLICT  
<222> (1)...(40)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 126  
Tyr Thr Ile Arg Asp Gly Phe Asn Leu Thr Asn Lys Gly Phe Asn Ile  
1 5 10 15  
Glu Asn Ser Gly Gln Asn Ile Glu Arg Asn Pro Ala Asp Leu Phe Thr  
20 25 30  
Lys Val Cys Leu Arg Leu Thr Lys  
35 40

<210> 127  
<211> 22  
<212> PRT  
<213> Clostridium botulinum serotype E

<220>  
<221> VARIANT  
<222> (1)...(22)  
<223> Variant of amino-terminal 30 amino acids of LC

<400> 127  
Met Pro Asp Pro Val Asn Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly  
1 5 10 15  
Gly Cys Gln Glu Phe Tyr  
20

<210> 128  
<211> 40  
<212> PRT  
<213> Clostridium botulinum serotype E

<220>  
<221> VARIANT  
<222> (1)...(40)  
<223>  
Variant of carboxyl-terminal 50 amino acids of LC

<400> 128  
Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala  
1 5 10 15  
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Arg Phe Cys Lys Asn Ile  
20 25 30

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Val Ser Val Lys Gly Ile Arg Lys  
35 40

<210> 129

<211> 20

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1)...(20)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 129

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Ile Lys Pro Gly Gly Cys  
1 5 10 15  
Gln Glu Phe Tyr  
20

<210> 130

<211> 44

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1)...(44)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 130

Gly Tyr Asn Ile Asn Asn Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile  
1 5 10 15  
Ile Thr Pro Ile Thr Gly Arg Gly Leu Val Lys Lys Ile Ile Arg Phe  
20 25 30  
Cys Lys Asn Ile Val Ser Val Lys Gly Ile Arg Lys  
35 40

<210> 131

<211> 22

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1)...(22)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 131

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg  
1 5 10 15  
Thr Ile Leu Tyr Ile Lys  
20

<210> 132

<211> 42

<212> PRT

<213> Clostridium botulinum serotype E

<220>

<221> VARIANT

<222> (1)...(42)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 132

Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala  
1 5 10 15  
Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val  
20 25 30  
Lys Lys Ile Ile Arg Lys Gly Ile Arg Lys  
35 40

<210> 133

<211> 25

<212> PRT

<213> Clostridium botulinum serotype F

<220>

<221> VARIANT

<222> (1)...(25)

<223> Variant of amino-terminal 30 amino acids of LC

<400> 133

Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp  
1 5 10 15  
Asp Thr Ile Leu Tyr Met Gln Ile Pro  
20 25

<210> 134

<211> 42

<212> PRT

<213> Clostridium botulinum serotype F

<220>

<221> VARIANT

<222> (1)...(42)

<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 134

Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn Asn Arg  
1 5 10 15  
Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Ser Ile Pro Asp  
20 25 30  
Lys Phe Cys Lys Ser Val Ile Pro Arg Lys  
35 40

<210> 135  
<211> 38  
<212> PRT  
<213> Clostridium botulinum serotype G

<220>  
<221> VARIANT  
<222> (1)...(38)  
<223> Variant of carboxyl-terminal 50 amino acids of LC

<400> 135  
Gln Asn Glu Gly Phe Asn Ile Ala Ser Lys Asn Leu Lys Thr Glu Phe  
1 5 10 15  
Asn Gly Gln Asn Lys Ala Val Asn Lys Glu Ala Arg Ile Ala Met Cys  
20 25 30  
Lys Pro Val Met Tyr Lys  
35

<210> 136  
<211> 423  
<212> PRT  
<213> Artificial Sequence

<220>  
<221> DOMAIN  
<222> (1)...(423)  
<223> BoNT/A-BoNT/E chimeric LC

<400> 136  
Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Asn Asp Arg  
1 5 10 15  
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser  
20 25 30  
Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile  
35 40 45  
Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly  
50 55 60  
Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys  
65 70 75 80  
Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn  
85 90 95  
Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro  
100 105 110  
Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp  
115 120 125  
Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu  
130 135 140  
Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr  
145 150 155 160  
Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His  
165 170 175  
Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

180	185	190
Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu		
195	200	205
Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala		
210	215	220
Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu		
225	230	235
Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly		
245	250	255
Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr		
260	265	270
Thr Asn Leu Leu Ala Asp Tyr Lys Ile Ala Ser Lys Leu Ser Lys		
275	280	285
Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu		
290	295	300
Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn		
305	310	315
Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu		
325	330	335
Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile		
340	345	350
Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Leu Asn Asp Ser Ile		
355	360	365
Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe		
370	375	380
Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr		
385	390	395
Gly Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val		
405	410	415
Arg Gly Ile Ile Thr Ser Lys		
420		

&lt;210&gt; 137

&lt;211&gt; 441

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(441)

&lt;223&gt; BoNT/A-BoNT/B chimeric LC

&lt;400&gt; 137

Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly			
1	5	10	15
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gly Arg			
20	25	30	
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu			
35	40	45	
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly			
50	55	60	
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn			
65	70	75	80
Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe			

Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile	85	90	95
100	105	110	
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu	115	120	125
130	135	140	
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn	145	150	155
160			
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile	145	150	160
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly	165	170	175
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln	180	185	190
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu	195	200	205
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro	210	215	220
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr	225	230	235
240			
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe	245	250	255
Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe	260	265	270
Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile	275	280	285
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn	290	295	300
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr	305	310	315
320			
Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly	325	330	335
Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu	340	345	350
350			
Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys	355	360	365
Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro Val Lys Ile Lys	370	375	380
380			
Asn Leu Leu Asp Asn Glu Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile	385	390	395
400			
Ser Asp Lys Asn Met Gly Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile	405	410	415
420	425	430	
Lys Ile Gln Met Cys Lys Ser Val Lys	435	440	

&lt;210&gt; 138

&lt;211&gt; 423

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(423)

&lt;223&gt; BoNT/A-BoNT/E chimeric LC

&lt;400&gt; 138

Met Pro Phe Val Asn Lys Gln Phe Asn Asn Asp Pro Val Asn Asp Arg			
1	5	10	15
Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys Gln Glu Phe Tyr Lys Ser			
20	25	30	
Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu Arg Asn Val Ile			
35	40	45	
Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser Leu Lys Asn Gly			
50	55	60	
Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser Asp Glu Glu Lys			
65	70	75	80
Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn Arg Ile Asn Asn			
85	90	95	
Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser Lys Ala Asn Pro			
100	105	110	
Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe His Ile Gly Asp			
115	120	125	
Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser Gln Asp Ile Leu			
130	135	140	
Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp Leu Phe Glu Thr			
145	150	155	160
Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met Pro Ser Asn His			
165	170	175	
Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro Glu Tyr Ser Phe			
180	185	190	
Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln Asp Pro Ala Leu			
195	200	205	
Thr Leu Met His Glu Leu Ile His Ser Leu His Gly Leu Tyr Gly Ala			
210	215	220	
Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys Gln Asn Pro Leu			
225	230	235	240
Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu Glu Phe Leu Thr Phe Gly			
245	250	255	
Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala Gln Ser Asn Asp Ile Tyr			
260	265	270	
Thr Asn Leu Leu Ala Asp Tyr Lys Ile Ala Ser Lys Leu Ser Lys			
275	280	285	
Val Gln Val Ser Asn Pro Leu Leu Asn Pro Tyr Lys Asp Val Phe Glu			
290	295	300	
Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser Gly Ile Tyr Ser Val Asn			
305	310	315	320
Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys Leu Tyr Ser Phe Thr Glu			
325	330	335	
Phe Asp Leu Ala Thr Lys Phe Gln Val Lys Cys Arg Gln Thr Tyr Ile			
340	345	350	
Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn Leu Asn Asp Ser Ile			
355	360	365	
Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn Asn Leu Lys Val Asn Phe			
370	375	380	
Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg Ile Ile Thr Pro Ile Thr			
385	390	395	400
Gly Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val			
405	410	415	

Arg Gly Ile Ile Thr Ser Lys  
420

<210> 139  
<211> 441  
<212> PRT  
<213> Artificial Sequence

<220>  
<221> DOMAIN  
<222> (1)...(441)  
<223> BoNT/A-BoNT/B chimeric LC

<400> 139  
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Asn Asp Pro Ile Asp Asn  
1 5 10 15  
Asp Asn Ile Ile Met Met Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg  
20 25 30  
Tyr Tyr Lys Ala Phe Lys Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu  
35 40 45  
Arg Tyr Thr Phe Gly Tyr Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly  
50 55 60  
Ile Phe Asn Arg Asp Val Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn  
65 70 75 80  
Thr Asn Asp Lys Lys Asn Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe  
85 90 95  
Asn Arg Ile Lys Ser Lys Pro Leu Gly Glu Lys Leu Leu Glu Met Ile  
100 105 110  
Ile Asn Gly Ile Pro Tyr Leu Gly Asp Arg Arg Val Pro Leu Glu Glu  
115 120 125  
Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys Leu Ile Ser Asn  
130 135 140  
Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile  
145 150 155 160  
Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly  
165 170 175  
Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly Gly Ile Met Gln  
180 185 190  
Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn Asn Val Gln Glu  
195 200 205  
Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro  
210 215 220  
Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu His Gly Leu Tyr  
225 230 235 240  
Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn Glu Lys Lys Phe  
245 250 255  
Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu Leu Tyr Thr Phe  
260 265 270  
Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile  
275 280 285  
Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val Asp Arg Leu Asn  
290 295 300  
Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr  
305 310 315 320

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

Lys	Asn	Lys	Phe	Lys	Asp	Lys	Tyr	Lys	Phe	Val	Glu	Asp	Ser	Glu	Gly
			325			330					335				
Lys	Tyr	Ser	Ile	Asp	Val	Glu	Ser	Phe	Asn	Lys	Leu	Tyr	Lys	Ser	Leu
			340			345					350				
Met	Leu	Gly	Phe	Thr	Glu	Ile	Asn	Ile	Ala	Glu	Asn	Tyr	Lys	Ile	Lys
			355			360				365					
Thr	Arg	Ala	Ser	Tyr	Phe	Ser	Asp	Ser	Leu	Pro	Pro	Val	Lys	Ile	Lys
			370			375				380					
Asn	Leu	Leu	Asp	Asn	Glu	Ile	Tyr	Thr	Ile	Glu	Glu	Gly	Phe	Asn	Ile
			385			390				395			400		
Ser	Asp	Lys	Asn	Met	Gly	Lys	Glu	Tyr	Arg	Gly	Gln	Asn	Lys	Ala	Ile
			405			410				415					
Asn	Lys	Gln	Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu	Phe	Tyr	Lys	Leu	Leu
			420			425				430					
Cys	Val	Arg	Gly	Ile	Ile	Thr	Ser	Lys							
			435			440									

&lt;210&gt; 140

&lt;211&gt; 436

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(436)

&lt;223&gt; BoNT/A-BoNT/F chimeric LC

&lt;400&gt; 140

Met	Pro	Phe	Val	Asn	Lys	Gln	Phe	Asn	Tyr	Asn	Asp	Pro	Val	Asn	Asp
1				5				10			15				
Asp	Thr	Ile	Leu	Tyr	Met	Gln	Ile	Pro	Tyr	Glu	Glu	Ser	Lys	Lys	
				20				25			30				
Tyr	Tyr	Lys	Ala	Phe	Glu	Ile	Met	Arg	Asn	Val	Trp	Ile	Ile	Pro	Glu
			35			40					45				
Arg	Asn	Thr	Ile	Gly	Thr	Asn	Pro	Ser	Asp	Phe	Asp	Pro	Pro	Ala	Ser
			50			55				60					
Leu	Lys	Asn	Gly	Ser	Ser	Ala	Tyr	Tyr	Asp	Pro	Asn	Tyr	Leu	Thr	Thr
	65					70				75			80		
Asp	Ala	Glu	Lys	Asp	Arg	Tyr	Leu	Lys	Thr	Thr	Ile	Lys	Leu	Phe	Lys
			85			90				95					
Arg	Ile	Asn	Ser	Asn	Pro	Ala	Gly	Lys	Val	Leu	Leu	Gln	Glu	Ile	Ser
			100			105				110					
Tyr	Ala	Lys	Pro	Tyr	Leu	Gly	Asn	Asp	His	Thr	Pro	Ile	Asp	Glu	Phe
			115			120				125					
Ser	Pro	Val	Thr	Arg	Thr	Thr	Ser	Val	Asn	Ile	Lys	Leu	Ser	Thr	Asn
			130			135				140					
Val	Glu	Ser	Ser	Met	Leu	Leu	Asn	Leu	Leu	Val	Leu	Gly	Ala	Gly	Pro
	145				150				155			160			
Asp	Ile	Phe	Glu	Ser	Cys	Cys	Tyr	Pro	Val	Arg	Lys	Leu	Ile	Asp	Pro
			165			170				175					
Asp	Val	Val	Tyr	Asp	Pro	Ser	Asn	Tyr	Gly	Phe	Gly	Ser	Ile	Asn	Ile
			180			185				190					
Val	Thr	Phe	Ser	Pro	Glu	Tyr	Glu	Tyr	Thr	Phe	Asn	Asp	Ile	Ser	Gly
	195				200				205						

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp Pro Ala Ile Ser  
 210 215 220  
 Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu Tyr Gly Ala Arg  
 225 230 235 240  
 Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln Ala Pro Leu Met  
 245 250 255  
 Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu Thr Phe Gly Gly  
 260 265 270  
 Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu Lys Ile Tyr Asn  
 275 280 285  
 Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg Leu Ser Glu Val  
 290 295 300  
 Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr Lys Asp Tyr Phe  
 305 310 315 320  
 Gln Trp Lys Tyr Glu Leu Asp Lys Asn Ala Asp Gly Ser Tyr Thr Val  
 325 330 335  
 Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu Tyr Ser Phe Thr  
 340 345 350  
 Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys Arg Asn Thr Tyr  
 355 360 365  
 Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu Leu Asp Asp Asp  
 370 375 380  
 Ile Tyr Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu Ala Val Asn  
 385 390 395 400  
 Asn Arg Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile Asp Lys Asn  
 405 410 415  
 Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile  
 420 425 430  
 Ile Thr Ser Lys  
 435

<210> 141  
<211> 483  
<212> PRT  
<213> Artificial Sequence

<220>  
<221> DOMAIN  
<222> (1)...(483)  
<223> BoNT/A-BoNT/B chimeric LC

<400> 141  
Met Pro Phe Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val Asn Gly  
 1 5 10 15  
Val Asp Ile Ala Tyr Ile Lys Ile Pro Asn Ala Gly Gln Met Gln Pro  
 20 25 30  
Val Lys Ala Phe Lys Ile His Asn Lys Ile Trp Val Ile Pro Glu Arg  
 35 40 45  
Asp Thr Phe Tyr Asn Asp Pro Ile Asp Asn Asp Asn Ile Ile Met Met  
 50 55 60  
Glu Pro Pro Phe Ala Arg Gly Thr Gly Arg Tyr Tyr Lys Ala Phe Lys  
 65 70 75 80  
Ile Thr Asp Arg Ile Trp Ile Ile Pro Glu Arg Tyr Thr Phe Gly Tyr  
 85 90 95

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

Lys Pro Glu Asp Phe Asn Lys Ser Ser Gly Ile Phe Asn Arg Asp Val  
   100                   105                   110  
 Cys Glu Tyr Tyr Asp Pro Asp Tyr Leu Asn Thr Asn Asp Lys Lys Asn  
   115                   120                   125  
 Ile Phe Phe Gln Thr Leu Ile Lys Leu Phe Asn Arg Ile Lys Ser Lys  
   130                   135                   140  
 Pro Leu Gly Glu Lys Leu Leu Glu Met Ile Ile Asn Gly Ile Pro Tyr  
   145                   150                   155                   160  
 Leu Gly Asp Arg Arg Val Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala  
   165                   170                   175  
 Ser Val Thr Val Asn Lys Leu Ile Ser Asn Pro Gly Glu Val Glu Arg  
   180                   185                   190  
 Lys Lys Gly Ile Phe Ala Asn Leu Ile Ile Phe Gly Pro Gly Pro Val  
   195                   200                   205  
 Leu Asn Glu Asn Glu Thr Ile Asp Ile Gly Ile Gln Asn His Phe Ala  
   210                   215                   220  
 Ser Arg Glu Gly Phe Gly Gly Ile Met Gln Met Lys Phe Cys Pro Glu  
   225                   230                   235                   240  
 Tyr Val Ser Val Phe Asn Asn Val Gln Glu Asn Lys Gly Ala Ser Ile  
   245                   250                   255  
 Phe Asn Arg Arg Gly Tyr Phe Ser Asp Pro Ala Leu Ile Leu Met His  
   260                   265                   270  
 Glu Leu Ile His Val Leu His Gly Leu Tyr Gly Ile Lys Val Asp Asp  
   275                   280                   285  
 Leu Pro Ile Val Pro Asn Glu Lys Lys Phe Phe Met Gln Ser Thr Asp  
   290                   295                   300  
 Thr Ile Gln Ala Glu Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser  
   305                   310                   315                   320  
 Ile Ile Ser Pro Ser Thr Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln  
   325                   330                   335  
 Asn Phe Arg Gly Ile Val Asp Arg Leu Asn Lys Val Leu Val Cys Ile  
   340                   345                   350  
 Ser Asp Pro Asn Ile Asn Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp  
   355                   360                   365  
 Lys Tyr Lys Phe Val Glu Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val  
   370                   375                   380  
 Glu Ser Phe Asn Lys Leu Tyr Lys Ser Leu Met Leu Gly Phe Thr Glu  
   385                   390                   395                   400  
 Ile Asn Ile Ala Glu Asn Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe  
   405                   410                   415  
 Ser Asp Ser Leu Pro Pro Val Lys Ile Lys Asn Leu Leu Asp Asn Glu  
   420                   425                   430  
 Ile Tyr Thr Ile Glu Glu Gly Phe Asn Ile Ser Asp Lys Asn Met Gly  
   435                   440                   445  
 Lys Glu Tyr Arg Gly Gln Asn Lys Ala Ile Asn Lys Gln Ala Tyr Glu  
   450                   455                   460  
 Glu Ile Ser Lys Glu His Leu Ala Val Tyr Lys Ile Gln Met Cys Lys  
   465                   470                   475                   480  
 Ser Val Lys

&lt;210&gt; 142

&lt;211&gt; 458

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(458)

&lt;223&gt; BoNT/A-BoNT/E chimeric LC

&lt;400&gt; 142

Met	Pro	Lys	Ile	Asn	Ser	Phe	Asn	Tyr	Asn	Asp	Pro	Val	Asn	Asp	Arg
1															15
Thr	Ile	Leu	Tyr	Ile	Lys	Pro	Gly	Gly	Cys	Gln	Glu	Phe	Tyr	Lys	Ser
															30
Phe	Asn	Ile	Met	Lys	Asn	Ile	Trp	Ile	Ile	Pro	Glu	Arg	Asn	Val	Ile
															45
Gly	Thr	Thr	Pro	Gln	Asp	Phe	His	Pro	Pro	Thr	Ser	Leu	Lys	Asn	Gly
															50
Asp	Ser	Ser	Tyr	Tyr	Asp	Pro	Asn	Tyr	Leu	Gln	Ser	Asp	Glu	Glu	Lys
															60
Asp	Arg	Phe	Leu	Lys	Ile	Val	Thr	Lys	Ile	Phe	Asn	Arg	Ile	Asn	Asn
															85
Asn	Leu	Ser	Gly	Gly	Ile	Leu	Leu	Glu	Leu	Ser	Lys	Ala	Asn	Pro	
															100
Tyr	Leu	Gly	Asn	Asp	Asn	Thr	Pro	Asp	Asn	Gln	Phe	His	Ile	Gly	Asp
															115
Ala	Ser	Ala	Val	Glu	Ile	Lys	Phe	Ser	Asn	Gly	Ser	Gln	Asp	Ile	Leu
															130
Leu	Pro	Asn	Val	Ile	Ile	Met	Gly	Ala	Glu	Pro	Asp	Leu	Phe	Glu	
															145
Asn	Ser	Ser	Asn	Ile	Ser	Leu	Arg	Asn	Asn	Tyr	Met	Pro	Ser	Asn	His
															165
Gly	Phe	Gly	Ser	Ile	Ala	Ile	Val	Thr	Phe	Ser	Pro	Glu	Tyr	Ser	Phe
															180
Arg	Phe	Asn	Asp	Asn	Ser	Met	Asn	Glu	Phe	Ile	Gln	Asp	Pro	Ala	Leu
															195
Thr	Leu	Met	His	Glu	Leu	Ile	His	Ser	Leu	His	Gly	Leu	Tyr	Gly	Ala
															210
Lys	Gly	Ile	Thr	Thr	Lys	Tyr	Thr	Ile	Thr	Gln	Lys	Gln	Asn	Pro	Leu
															225
Ile	Thr	Asn	Ile	Arg	Gly	Thr	Asn	Ile	Glu	Glu	Phe	Leu	Thr	Phe	Gly
															245
Gly	Thr	Asp	Leu	Asn	Ile	Ile	Thr	Ser	Ala	Gln	Ser	Asn	Ile	Tyr	
															260
Thr	Asn	Leu	Leu	Ala	Asp	Tyr	Lys	Ile	Ala	Ser	Lys	Leu	Ser	Lys	
															275
Val	Gln	Val	Ser	Asn	Pro	Leu	Leu	Asn	Pro	Tyr	Lys	Asp	Val	Phe	Glu
															290
Ala	Lys	Tyr	Gly	Leu	Asp	Lys	Asp	Ala	Ser	Gly	Ile	Tyr	Ser	Val	Asn
															305
Ile	Asn	Lys	Phe	Asn	Ile	Ile	Phe	Lys	Lys	Leu	Tyr	Ser	Phe	Thr	Glu
															325
Phe	Asp	Leu	Ala	Thr	Lys	Phe	Gln	Val	Lys	Cys	Arg	Gln	Thr	Tyr	Ile
															340
Gly	Gln	Tyr	Lys	Tyr	Phe	Lys	Leu	Ser	Asn	Leu	Asn	Asp	Ser	Ile	
															355
Tyr	Asn	Ile	Ser	Glu	Gly	Tyr	Asn	Ile	Asn	Asn	Leu	Lys	Val	Asn	Phe

370	375	380
Arg Gly Gln Asn Ala Asn	Leu Asn Pro Arg Ile Ile Thr Pro Gly Phe	
385	390	395
Asn Leu Arg Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr		400
405	410	415
Glu Ile Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu		
420	425	430
Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys		
435	440	445
Asn Ile Val Ser Val Lys Gly Ile Arg Lys		
450	455	

&lt;210&gt; 143

&lt;211&gt; 443

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(443)

&lt;223&gt; BoNT/α-BoNT/E chimeric LC

&lt;400&gt; 143

Met Pro Lys Ile Asn Ser Phe Asn Tyr Met Pro Phe Val Asn Lys Gln			
1	5	10	15
Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys			
20	25	30	
Ile Pro Asn Ala Gly Gln Met Tyr Ile Lys Pro Gly Gly Cys Gln Glu			
35	40	45	
Phe Tyr Lys Ser Phe Asn Ile Met Lys Asn Ile Trp Ile Ile Pro Glu			
50	55	60	
Arg Asn Val Ile Gly Thr Thr Pro Gln Asp Phe His Pro Pro Thr Ser			
65	70	75	80
Leu Lys Asn Gly Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu Gln Ser			
85	90	95	
Asp Glu Glu Lys Asp Arg Phe Leu Lys Ile Val Thr Lys Ile Phe Asn			
100	105	110	
Arg Ile Asn Asn Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu Leu Ser			
115	120	125	
Lys Ala Asn Pro Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn Gln Phe			
130	135	140	
His Ile Gly Asp Ala Ser Ala Val Glu Ile Lys Phe Ser Asn Gly Ser			
145	150	155	160
Gln Asp Ile Leu Leu Pro Asn Val Ile Ile Met Gly Ala Glu Pro Asp			
165	170	175	
Leu Phe Glu Thr Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn Tyr Met			
180	185	190	
Pro Ser Asn His Gly Phe Gly Ser Ile Ala Ile Val Thr Phe Ser Pro			
195	200	205	
Glu Tyr Ser Phe Arg Phe Asn Asp Asn Ser Met Asn Glu Phe Ile Gln			
210	215	220	
Asp Pro Ala Leu Thr Leu Met His Glu Leu Ile His Ser Leu His Gly			
225	230	235	240
Leu Tyr Gly Ala Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr Gln Lys			

Gln	Asn	Pro	Leu	Ile	Thr	Asn	Ile	Arg	Gly	Thr	Asn	Ile	Glu	Glu	Phe
245															
Leu	Thr	Phe	Gly	Gly	Thr	Asp	Leu	Asn	Ile	Ile	Thr	Ser	Ala	Gln	Ser
260															270
Asn	Asp	Ile	Tyr	Thr	Asn	Leu	Leu	Ala	Asp	Tyr	Lys	Lys	Ile	Ala	Ser
275															285
Asp	Val	Phe	Glu	Ala	Lys	Tyr	Gly	Leu	Asp	Lys	Asp	Ala	Ser	Gly	Ile
290															300
Lys	Leu	Ser	Lys	Val	Gln	Val	Ser	Asn	Pro	Leu	Leu	Asn	Pro	Tyr	Lys
305															315
Asp	Val	Phe	Glu	Ala	Lys	Tyr	Gly	Leu	Asp	Lys	Asp	Ala	Ser	Gly	Ile
320															335
Tyr	Ser	Val	Asn	Ile	Asn	Lys	Phe	Asn	Asp	Ile	Phe	Lys	Lys	Leu	Tyr
325															340
Ser	Phe	Thr	Glu	Phe	Asp	Leu	Ala	Thr	Lys	Phe	Gln	Val	Lys	Cys	Arg
335															355
Gln	Thr	Tyr	Ile	Gly	Gln	Tyr	Lys	Tyr	Phe	Lys	Leu	Ser	Asn	Leu	Leu
340															370
Asn	Asp	Ser	Ile	Tyr	Ile	Ser	Glu	Gly	Phe	Asn	Leu	Arg	Asn	Thr	
345															385
Asn	Leu	Ala	Ala	Asn	Phe	Asn	Gly	Gln	Asn	Thr	Glu	Ile	Asn	Asn	Met
350															405
Asn	Phe	Thr	Lys	Leu	Lys	Asn	Phe	Thr	Gly	Leu	Phe	Glu	Phe	Tyr	Lys
355															420
Leu	Leu	Cys	Val	Arg	Gly	Ile	Ile	Thr	Ser	Lys					
360															435
															440

&lt;210&gt; 144

&lt;211&gt; 461

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(461)

&lt;223&gt; BoNT/A-BoNT/B chimeric LC

&lt;400&gt; 144

Met	Pro	Val	Thr	Ile	Asn	Asn	Phe	Asn	Met	Pro	Phe	Val	Asn	Lys	Gln
1									5			10			15
Phe	Asn	Tyr	Lys	Asp	Pro	Val	Asn	Gly	Val	Asp	Ile	Ala	Tyr	Ile	Lys
									20			25			30
Ile	Pro	Asn	Ala	Gly	Gln	Met	Ile	Met	Met	Glu	Pro	Pro	Phe	Ala	Arg
									35			40			45
Gly	Thr	Gly	Arg	Tyr	Tyr	Lys	Ala	Phe	Lys	Ile	Thr	Asp	Arg	Ile	Trp
									50			55			60
Ile	Ile	Pro	Glu	Arg	Tyr	Thr	Phe	Gly	Tyr	Lys	Pro	Glu	Asp	Phe	Asn
									65			70			75
Lys	Ser	Ser	Gly	Ile	Phe	Asn	Arg	Asp	Val	Cys	Glu	Tyr	Tyr	Asp	Pro
									85			90			95
Asp	Tyr	Leu	Asn	Thr	Asn	Asp	Lys	Asn	Ile	Phe	Phe	Gln	Thr	Leu	
									100			105			110
Ile	Lys	Leu	Phe	Asn	Arg	Ile	Lys	Ser	Lys	Pro	Leu	Gly	Glu	Lys	Leu
									115			120			125
Leu	Glu	Met	Ile	Ile	Asn	Gly	Ile	Pro	Tyr	Leu	Gly	Asp	Arg	Arg	Val

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

130	135	140
Pro Leu Glu Glu Phe Asn Thr Asn Ile Ala Ser Val Thr Val Asn Lys		
145	150	155
Leu Ile Ser Asn Pro Gly Glu Val Glu Arg Lys Lys Gly Ile Phe Ala		160
165	170	175
Asn Leu Ile Ile Phe Gly Pro Gly Pro Val Leu Asn Glu Asn Glu Thr		
180	185	190
Ile Asp Ile Gly Ile Gln Asn His Phe Ala Ser Arg Glu Gly Phe Gly		195
195	200	205
Gly Ile Met Gln Met Lys Phe Cys Pro Glu Tyr Val Ser Val Phe Asn		
210	215	220
Asn Val Gln Glu Asn Lys Gly Ala Ser Ile Phe Asn Arg Arg Gly Tyr		
225	230	235
Phe Ser Asp Pro Ala Leu Ile Leu Met His Glu Leu Ile His Val Leu		240
245	250	255
His Gly Leu Tyr Gly Ile Lys Val Asp Asp Leu Pro Ile Val Pro Asn		
260	265	270
Glu Lys Lys Phe Phe Met Gln Ser Thr Asp Thr Ile Gln Ala Glu Glu		
275	280	285
Leu Tyr Thr Phe Gly Gly Gln Asp Pro Ser Ile Ile Ser Pro Ser Thr		
290	295	300
Asp Lys Ser Ile Tyr Asp Lys Val Leu Gln Asn Phe Arg Gly Ile Val		
305	310	315
Asp Arg Leu Asn Lys Val Leu Val Cys Ile Ser Asp Pro Asn Ile Asn		320
325	330	335
Ile Asn Ile Tyr Lys Asn Lys Phe Lys Asp Lys Tyr Lys Phe Val Glu		
340	345	350
Asp Ser Glu Gly Lys Tyr Ser Ile Asp Val Glu Ser Phe Asn Lys Leu		
355	360	365
Tyr Lys Ser Leu Met Leu Gly Phe Thr Glu Ile Asn Ile Ala Glu Asn		
370	375	380
Tyr Lys Ile Lys Thr Arg Ala Ser Tyr Phe Ser Asp Ser Leu Pro Pro		
385	390	395
Val Lys Ile Lys Asn Leu Leu Asp Asn Glu Ile Gly Phe Asn Leu Arg		400
405	410	415
Asn Thr Asn Leu Ala Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn		
420	425	430
Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe		
435	440	445
Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser Lys		
450	455	460

&lt;210&gt; 145

&lt;211&gt; 456

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(456)

&lt;223&gt; BoNT/A-BoNT/F chimeric LC

&lt;400&gt; 145

Met Pro Val Ala Ile Asn Ser Phe Asn Met Pro Phe Val Asn Lys Gln

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

1	5	10	15
Phe Asn Tyr Lys Asp Pro Val Asn Gly Val Asp Ile Ala Tyr Ile Lys			
20	25		30
Ile Pro Asn Ala Gly Gln Met Leu Tyr Met Gln Ile Pro Tyr Glu Glu			
35	40	45	
Lys Ser Lys Lys Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp			
50	55	60	
Ile Ile Pro Glu Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp			
65	70	75	80
Pro Pro Ala Ser Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn			
85	90	95	
Tyr Leu Thr Thr Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile			
100	105	110	
Lys Leu Phe Lys Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu			
115	120	125	
Gln Glu Ile Ser Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro			
130	135	140	
Ile Asp Glu Phe Ser Pro Val Thr Arg Thr Ser Val Asn Ile Lys			
145	150	155	160
Leu Ser Thr Asn Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu			
165	170	175	
Gly Ala Gly Pro Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys			
180	185	190	
Leu Ile Asp Pro Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly			
195	200	205	
Ser Ile Asn Ile Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn			
210	215	220	
Asp Ile Ser Gly Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp			
225	230	235	240
Pro Ala Ile Ser Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu			
245	250	255	
Tyr Gly Ala Arg Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln			
260	265	270	
Ala Pro Leu Met Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu			
275	280	285	
Thr Phe Gly Gly Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu			
290	295	300	
Lys Ile Tyr Asn Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg			
305	310	315	320
Leu Ser Glu Val Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr			
325	330	335	
Lys Asp Tyr Phe Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly			
340	345	350	
Ser Tyr Thr Val Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu			
355	360	365	
Tyr Ser Phe Thr Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys			
370	375	380	
Arg Asn Thr Tyr Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu			
385	390	395	400
Leu Asp Asp Asp Ile Tyr Gly Phe Asn Leu Arg Asn Thr Asn Leu Ala			
405	410	415	
Ala Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr			
420	425	430	
Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys			
435	440	445	

Val Arg Gly Ile Ile Thr Ser Lys  
450 455

<210> 146

<211> 449

<212> PRT

<213> Artificial Sequence

<220>

<221> DOMAIN

<222> (1)...(449)

<223> BoNT/A-BoNT/E chimeric LC

<400> 146

Met Pro Lys Ile Asn Ser Phe Asn Tyr Asn Asp Pro Val Thr Ile Asn  
1 5 10 15  
Asn Phe Asn Tyr Asp Arg Thr Ile Leu Tyr Ile Lys Pro Gly Gly Cys  
20 25 30  
Gln Glu Phe Tyr Lys Ser Phe Asn Ile Met Lys Asn Ile Trp Ile Ile  
35 40 45  
Pro Glu Arg Asn Val Ile Gly Thr Thr Pro Gln Asp Phe His Pro Pro  
50 55 60  
Thr Ser Leu Lys Asn Gly Asp Ser Ser Tyr Tyr Asp Pro Asn Tyr Leu  
65 70 75 80  
Gln Ser Asp Glu Glu Lys Asp Arg Phe Leu Lys Ile Val Thr Lys Ile  
85 90 95  
Phe Asn Arg Ile Asn Asn Leu Ser Gly Gly Ile Leu Leu Glu Glu  
100 105 110  
Leu Ser Lys Ala Asn Pro Tyr Leu Gly Asn Asp Asn Thr Pro Asp Asn  
115 120 125  
Gln Phe His Ile Gly Asp Ala Ser Ala Val Glu Ile Lys Phe Ser Asn  
130 135 140  
Gly Ser Gln Asp Ile Leu Leu Pro Asn Val Ile Ile Met Gly Ala Glu  
145 150 155 160  
Pro Asp Leu Phe Glu Thr Asn Ser Ser Asn Ile Ser Leu Arg Asn Asn  
165 170 175  
Tyr Met Pro Ser Asn His Gly Phe Gly Ser Ile Ala Ile Val Thr Phe  
180 185 190  
Ser Pro Glu Tyr Ser Phe Arg Phe Asn Asp Asn Ser Met Asn Glu Phe  
195 200 205  
Ile Gln Asp Pro Ala Leu Thr Leu Met His Glu Leu Ile His Ser Leu  
210 215 220  
His Gly Leu Tyr Gly Ala Lys Gly Ile Thr Thr Lys Tyr Thr Ile Thr  
225 230 235 240  
Gln Lys Gln Asn Pro Leu Ile Thr Asn Ile Arg Gly Thr Asn Ile Glu  
245 250 255  
Glu Phe Leu Thr Phe Gly Gly Thr Asp Leu Asn Ile Ile Thr Ser Ala  
260 265 270  
Gln Ser Asn Asp Ile Tyr Thr Asn Leu Leu Ala Asp Tyr Lys Lys Ile  
275 280 285  
Ala Ser Lys Leu Ser Lys Val Gln Val Ser Asn Pro Leu Leu Asn Pro  
290 295 300  
Tyr Lys Asp Val Phe Glu Ala Lys Tyr Gly Leu Asp Lys Asp Ala Ser  
305 310 315 320

## Steward, L. E. et al., Clostridial Neurotoxin Compositions and Modified Clostridial Neurotoxins

Gly Ile Tyr Ser Val Asn Ile Asn Lys Phe Asn Asp Ile Phe Lys Lys			
325	330	335	
Leu Tyr Ser Phe Thr Glu Phe Asp Leu Ala Thr Lys Phe Gln Val Lys			
340	345	350	
Cys Arg Gln Thr Tyr Ile Gly Gln Tyr Lys Tyr Phe Lys Leu Ser Asn			
355	360	365	
Leu Leu Asn Asp Ser Ile Tyr Asn Ile Ser Glu Gly Tyr Asn Ile Asn			
370	375	380	
Asn Leu Lys Val Asn Phe Arg Gly Gln Asn Ala Asn Leu Asn Pro Arg			
385	390	395	400
Ile Ile Thr Pro Ile Thr Gly Arg Gly Leu Val Lys Lys Ile Ile Arg			
405	410	415	
Phe Cys Lys Asn Asn Met Asn Phe Thr Lys Leu Lys Asn Phe Thr Gly			
420	425	430	
Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val Arg Gly Ile Ile Thr Ser			
435	440	445	
Lys			

&lt;210&gt; 147

&lt;211&gt; 459

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; DOMAIN

&lt;222&gt; (1)...(459)

&lt;223&gt; BoNT/A-BoNT/B-BoNT/F chimeric LC

&lt;400&gt; 147

Met Pro Val Ala Ile Asn Ser Phe Asn Tyr Asn Asp Val Thr Ile Asn			
1	5	10	15
Asn Phe Asn Tyr Thr Ile Leu Tyr Met Gln Ile Pro Tyr Glu Glu Lys			
20	25	30	
Ser Lys Lys Tyr Tyr Lys Ala Phe Glu Ile Met Arg Asn Val Trp Ile			
35	40	45	
Ile Pro Glu Arg Asn Thr Ile Gly Thr Asn Pro Ser Asp Phe Asp Pro			
50	55	60	
Pro Ala Ser Leu Lys Asn Gly Ser Ser Ala Tyr Tyr Asp Pro Asn Tyr			
65	70	75	80
Leu Thr Thr Asp Ala Glu Lys Asp Arg Tyr Leu Lys Thr Thr Ile Lys			
85	90	95	
Leu Phe Lys Arg Ile Asn Ser Asn Pro Ala Gly Lys Val Leu Leu Gln			
100	105	110	
Glu Ile Ser Tyr Ala Lys Pro Tyr Leu Gly Asn Asp His Thr Pro Ile			
115	120	125	
Asp Glu Phe Ser Pro Val Thr Arg Thr Thr Ser Val Asn Ile Lys Leu			
130	135	140	
Ser Thr Asn Val Glu Ser Ser Met Leu Leu Asn Leu Leu Val Leu Gly			
145	150	155	160
Ala Gly Pro Asp Ile Phe Glu Ser Cys Cys Tyr Pro Val Arg Lys Leu			
165	170	175	
Ile Asp Pro Asp Val Val Tyr Asp Pro Ser Asn Tyr Gly Phe Gly Ser			
180	185	190	

Ile Asn Ile Val Thr Phe Ser Pro Glu Tyr Glu Tyr Thr Phe Asn Asp  
 195 200 205  
 Ile Ser Gly Gly His Asn Ser Ser Thr Glu Ser Phe Ile Ala Asp Pro  
 210 215 220  
 Ala Ile Ser Leu Ala His Glu Leu Ile His Ala Leu His Gly Leu Tyr  
 225 230 235 240  
 Gly Ala Arg Gly Val Thr Tyr Glu Glu Thr Ile Glu Val Lys Gln Ala  
 245 250 255  
 Pro Leu Met Ile Ala Glu Lys Pro Ile Arg Leu Glu Glu Phe Leu Thr  
 260 265 270  
 Phe Gly Gly Gln Asp Leu Asn Ile Ile Thr Ser Ala Met Lys Glu Lys  
 275 280 285  
 Ile Tyr Asn Asn Leu Leu Ala Asn Tyr Glu Lys Ile Ala Thr Arg Leu  
 290 295 300  
 Ser Glu Val Asn Ser Ala Pro Pro Glu Tyr Asp Ile Asn Glu Tyr Lys  
 305 310 315 320  
 Asp Tyr Phe Gln Trp Lys Tyr Gly Leu Asp Lys Asn Ala Asp Gly Ser  
 325 330 335  
 Tyr Thr Val Asn Glu Asn Lys Phe Asn Glu Ile Tyr Lys Lys Leu Tyr  
 340 345 350  
 Ser Phe Thr Glu Ser Asp Leu Ala Asn Lys Phe Lys Val Lys Cys Arg  
 355 360 365  
 Asn Thr Tyr Phe Ile Lys Tyr Glu Phe Leu Lys Val Pro Asn Leu Leu  
 370 375 380  
 Asp Asp Asp Ile Tyr Thr Val Ser Glu Gly Phe Asn Ile Gly Asn Leu  
 385 390 395 400  
 Ala Val Asn Asn Arg Gly Gln Ser Ile Lys Leu Asn Pro Lys Ile Ile  
 405 410 415  
 Asp Ser Ile Pro Asp Lys Gly Leu Val Glu Lys Asn Asn Met Asn Phe  
 420 425 430  
 Thr Lys Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu  
 435 440 445  
 Cys Val Arg Gly Ile Ile Thr Ser Lys Arg Lys  
 450 455

&lt;210&gt; 148

&lt;211&gt; 59

&lt;212&gt; PRT

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;221&gt; PEPTIDE

&lt;222&gt; (1)...(59)

&lt;223&gt; Peptide comprising a 6x His tag and S-tag

&lt;400&gt; 148

Met His His His His His Ser Ser Gly Leu Val Pro Arg Gly Ser  
 1 5 10 15  
 Gly Met Lys Glu Thr Ala Ala Ala Lys Phe Glu Arg Gln His Met Asp  
 20 25 30  
 Ser Pro Asp Leu Gly Thr Asp Asp Asp Asp Lys Ala Met Gly Ser Phe  
 35 40 45  
 Val Asn Lys Gln Phe Asn Tyr Lys Asp Pro Val  
 50 55